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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/725,453	11/30/2000	Marco Ebert	00236	9472

7590 11/01/2002
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EXAMINER

KILKENNY, TODD J

ART UNIT	PAPER NUMBER
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1733

DATE MAILED: 11/01/2002

8

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/725,453

Applicant(s)

EBERT ET AL.

Examiner

Todd J. Kilkenny

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 September 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 20-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I in Paper No. 7 is acknowledged.
2. Claims 20-23 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 7.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 3 – 11, 13 and 16 – 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In general, all claims appear to be a direct translation into English from a foreign priority document and as such read rather unclearly. Applicant is asked to review all claims for grammatical errors and it is suggested to amend claims so as the positive method steps read in a more active tone.

There is a lack of antecedent basis throughout the claims as currently written. For example, claim 3 recites the limitation "the hardening" in line 5, claim 4 recites the limitation "the heat process" in line 5, claim 5 recites the limitation "the resin-impregnated preform" and "the heat treatment" in line 3, and claim 13 recites "the reinforcing fibers" in line 5. These are examples of the lack of antecedent basis

throughout the claims. Applicant is asked to review all claims for additional lack of antecedent basis issues.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 10 recites the broad recitation "a temperature T_1 where $500^{\circ}\text{C} < T_1 < 1450^{\circ}\text{C}$ " and the claim also recites "in particular $900^{\circ}\text{C} < T_1 < 1200^{\circ}\text{C}$ " which is the narrower statement of the range/limitation. Also, claim 11 recites the broad recitation "a temperature T_2 where $1500^{\circ}\text{C} < T_2 < 3000^{\circ}\text{C}$ " and the claim also recites "in particular $1800^{\circ}\text{C} < T_2 < 2500^{\circ}\text{C}$ " which is the narrower statement of the range/limitation.

Regarding claims 4 and 7, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

As to claims 16 – 19, it is unclear what applicant is trying to claim. The claims appear to be lacking a transitional phrase for separating the body of each of the claims from their respective preambles.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1 – 5, 7 – 13 and 16 - 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Booth (US 5,418,063) in view of Kawasaki et al (US 4,990,390) and Yeager (US 4,569,624) or Flonc et al (US 5,080,851).

Booth teaches a method of making a grid-like carbon-carbon composite by weaving together strands of carbon fabric formed of bundled carbon fibers impregnated with a carbon-containing matrix. The matrix is cured and then pyrolyzed to a temperature sufficient to carbonize the matrix material. After densifying the matrix, the composite is heated to an elevated temperature sufficient to graphitize the matrix material (Col. 3, lines 3 – 44). Booth does not suggest the thickness of the grid-like preform at the intersection points to be the same as the thickness of the adjoining portions. Furthermore, Booth appears to be silent as to placing said preform in a mold to cure the matrix.

As to the thickness of the preform at the intersecting points, Kawasaki et al. teach a carbon fiber grid comprising intersecting fiber bundles impregnated with a resin material. Referring to Figures 18 – 20, Kawasaki et al disclose intersection points having a similar thickness in comparison to the rest of the composite. Furthermore, Kawasaki et al teach pressing the intersection points so that the bulge at the intersecting section is compacted to the same thickness as the other sections of the grid (Col. 3, lines 25 - 29). Kawasaki et al suggest that pressing acts to greatly improve the strength and durability of the intersecting section and reduces the thickness of the entire grid (Col. 4, lines 21 – 33).

It would have been obvious to one of ordinary skill in the art at the time of the invention to press the intersecting sections of the carbon fiber grid-like composite of Booth so that the intersecting sections have the same thickness as the rest of the composite as such is known as taught by Kawasaki et al to improve the strength and durability of carbon fiber grid composites at their intersecting points.

As to the employment of a mold, Booth suggests stacking the preimpregnated carbon strands to form the preform and curing the resin by any suitable technique (Col. 3, lines 31 – 44). As is suggested by Yeager, it is known to employ a mold to cure the resin in a preimpregnated carbon-carbon composite lay-up, wherein the shape of the mold conforms to the geometric form of the product being formed (Col. 4, lines 9 – 41). It therefore would have been obvious to one of ordinary skill in the art at the time of the invention to cure the carbon strands of Booth in a mold as Booth suggests curing the resin by any suitable technique, wherein the use of a mold to cure is a conventional

technique as evidenced for example by Yeager for curing carbon/carbon composite and only the expected carbon-carbon composite product of Booth would be formed.

As an alternative to the preimpregnated lay-up and curing technique as suggested by Booth and Yeager, it would have been obvious to one of ordinary skill in the art to alternatively employ a resin transfer molding technique to form the cured preform of Booth and only the expected composite would be formed. One of ordinary skill in the art would be motivated to consider a resin transfer molding to better position and handle the carbon strands in forming the grid-like product of Booth. As evidenced by Flonc et al's teaching of a resin transfer molding process, one of ordinary skill in the art would readily recognize that upon employing the RTM method to form the composite of Booth, the carbon strands of Booth would be placed into a shaped mold in a dry state and resin would thereafter be injected into the mold and cured to form the shaped preform. Furthermore, Flonc et al suggest that stitching dry lays of the composite together prior to the resin transfer molding is a conventional technique to maintain the alignment and stabilize the fabric to prevent fraying (Col. 1, lines 15 – 20).

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Booth (US 5,418,063) in view of Kawasaki et al (US 4,990,390) and Yeager (US 4,569,624) or Flonc et al (US 5,080,851) as applied to claims 1 and 5 above, and further in view of Leoni et al (US 5,152,949).

As to the mold including flexible elements to aid in the removal of the preform, both Yeager and Flonc et al fail to positively suggest molds containing such flexible

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elements. However, molds comprising flexible elements are known as taught for example by Leoni et al in the resin transfer molding art. Leoni et al teaches a mold comprising a compliant mold subassembly, which further comprises conformable cauls and a flexible liner. The conformable cauls allow the mold subassembly to conform to the inner surface of the composite and facilitate the fabrication of composite articles having complex configurations. After curing, the molding apparatus is opened and the conformable cauls are removed, wherein their flexibility facilitates their removal. This flexibility is recognized as rendering the cauls deformable. It would have been obvious to one of ordinary skill in the art at the time of the invention to employ the mold of Leoni et al so as to provide a mold having a compliant subassembly which helps facilitate complex shaped composites and helps facilitate easy demolding of the complex finished composite article.

8. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Booth (US 5,418,063) in view of Kawasaki et al (US 4,990,390) and Yeager (US 4,569,624) as applied to claims 1 and 13 above, and further in view of Suokas et al (WO 92/11126).

Booth fails to suggest using a thermoplastic matrix material. However, thermoplastic matrix materials are known alternatives to thermosetting matrix materials in carbon/carbon composites as suggested by Suokas et al. It would have been obvious to one of ordinary skill in the art at the time of the invention to alternatively use a thermoplastic matrix, such as PEEK, in the composite of Booth as thermoplastic

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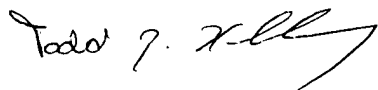
matrixes are known alternatives to thermosetting matrices as disclosed by Suokas et al, wherein one of ordinary skill in the art would be motivated to employ thermoplastic matrices over thermosetting matrices for the excellent physical and chemical properties of thermoplastics, including that their processing is based on heat and pressure, so that they are considerably faster to manufacture than thermosets and because thermoforming can be repeated several times, broken composites can be easily repaired.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Todd J. Kilkenny whose telephone number is (703) 305-6386. The examiner can normally be reached on Mon - Fri (9 - 5).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Ball can be reached on (703) 308-2058. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



TJK
October 30, 2002